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Underwater Archaeological Survey of the Proposed James Island Expressway Corridor Across the Ashley River and Wappoo Creek, Charleston County, S.C.

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Underwater Archaeological Survey of the Proposed James Island Expressway Corridor Across the Ashley River and Wappoo Creek, Charleston County, S.C.

Description

Between April 15th and May 10th, 1985, Institute personnel directed and carried out an underwater archeological survey of a section of the bottom of the Ashley River and Wappoo Creek where the James Island Bridge is to be constructed (Fig.2). Two types of survey methodology were employed: electronic sensing using a side scan sonar and magnetometer, and a visual investigation of the river and creek bottom using divers. Sonar and magnetometer lines were run up and down the river over a distance of 2,000 yards, covering the impact area where the Ashley River Bridge is to be located. The diver's visual investigation was restricted to a corridor 550 feet wide by the distance across the river. This was the area to be most heavily impacted by the bridge construction activity. In Wappoo Creek, divers investigated a 300 ft corridor across the creek where a section of the bridge is to be built. No remote sensing was carried out in this area because previous channel deepening and widening in the past would have destroyed any significant cultural remains. Through analysis of the records from both electronic and diver investigations, it was determined that there were no discernible archeological or paleontological reasons to delay the construction of the bridge.

Keywords

Excavations, Bridges, Underwater Archaeology, Ashley River, Wappoo Creek, James Island, Charleston County, South Carolina, Archeology

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UNDERWATER ARCHAEOLOGICAL SURVEY
OF THE PROPOSED JAMES ISLAND
EXPRESSWAY CORRIDOR ACROSS THE ASHLEY RIVER
AND WAPPOO CREEK, CHARLESTON COUNTY S.C.

by
Alan B. Albright
Mark M. Newell
David M. Brewer

Research Manuscript Series No. 197

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PREFACE

The marine and river systems of South Carolina contain a price-less cultural heritage in their underwater archaeological sites. These sites represent the entire range of time in which man has been associated within the region of this continent now known as South Carolina. The purpose of this survey was to carry out an intensive underwater archaeological investigation of portions of the Ashley River and Wappoo Creek (Fig.1) that might be adversely affected by operations concomitant with the construction of a bridge between Charleston and James Island. The survey was also conducted to determine the archaeological significance of the area. Should it have been determined that the area was archaeologically sensitive, plans would have been developed to mitigate any adverse effects to any detected sites or features. The project was scheduled to take 40 days, of which 20 were scheduled for fieldwork.

ABSTRACT

Between April 15th and May 10th, 1985, Institute personnel directed and carried out an underwater archeological survey of a section of the bottom of the Ashley River and Wappoo Creek where the James Island Bridge is to be constructed (Fig.2). Two types of survey methodology were employed: electronic sensing using a side scan sonar and magnetometer, and a visual investigation of the river and creek bottom using divers.

Sonar and magnetometer lines were run up and down the river over a distance of 2,000 yards, covering the impact area where the Ashley River Bridge is to be located. The diver's visual investigation was restricted to a corridor 550 feet wide by the distance across the river. This was the area to be most heavily impacted by the bridge construction activity. In Wappoo Creek, divers investigated a 300 ft corridor across the creek where a section of the bridge is to be built. No remote sensing was carried out in this area because previous channel deepening and widening in the past would have destroyed any significant cultural remains.

Through analysis of the records from both electronic and diver investigations, it was determined that there were no discernible archeological or paleontological reasons to delay the construction of the bridge.

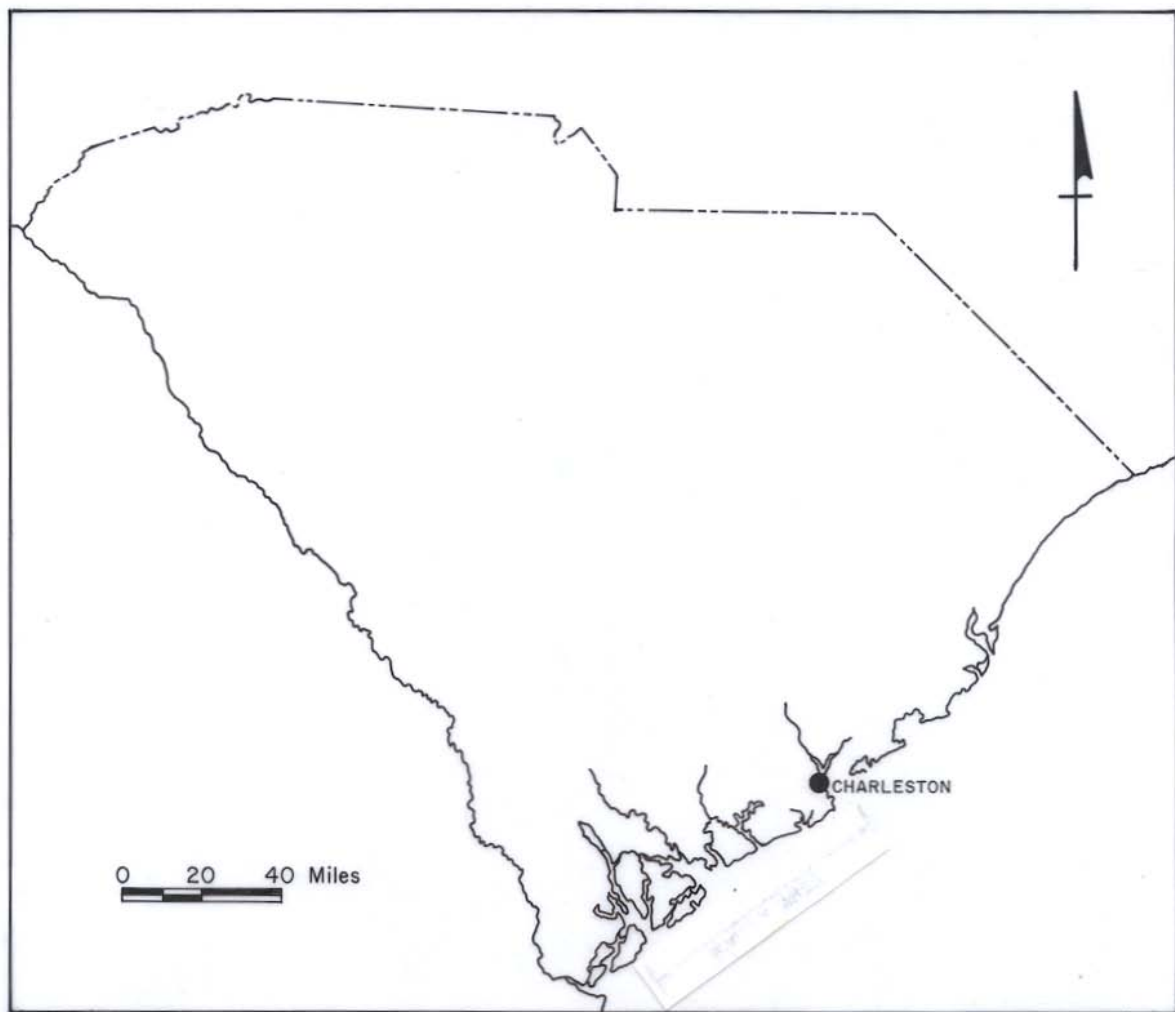


Figure 1:
Location of James Island Expressway survey

Plan of Operation

An intensive survey of this type involves the examination of the area using a number of different techniques and specialized instruments. The gathering of information on a site by electronic instrumentation is termed "remote sensing." Two types of remote sensing instruments were chosen for use in this survey. They were the proton magnetometer and side scan sonar.

A number of techniques for the physical evaluation of the survey area were also included in the plan of operation. These were the visual inspection of the impact areas and evaluation of remote sensing targets by divers, the excavation of test pits and the surface collection of artifacts.

Locational accuracy for survey operations.

The first stage of operational planning required development of a methodology to ensure the locational accuracy of survey operations in both the Ashley River and Wappoo Creek. This was done in the Ashley River survey area by establishing transit stations on the T. Allen Legare, Jr. Bridge. This is the downstream Ashley River Memorial Bridge from which the survey line control could best be directed.

Line spacing for the side scan sonar phase of the survey was established at 150 ft. The sonar instrument would be adjusted to examine the river bottom for a distance of 150 ft on either side of the survey vessel. The use of a 300 ft scanning distance set on a 150 ft lane ensured that the river bottom would be electronically examined twice, each time from a different direction. This was to be the case in all lanes but for those closest to the shore where water depth might inhibit accurate sonar coverage from two directions.

Line spacing for the proton magnetometer phase of the survey was established at 50 ft. This distance was planned to take into consideration the different characteristics of the magnetometer, compared to the sonar. These include the necessity for the device to be much closer to ferrous magnetic objects in order to detect them on or under the river bottom.

Plans for the visual investigation of the river bottom in the Ashley survey area called for the systematic examination of a corridor on the river bottom. This would be from one bank to the other, in the area to be directly impacted by the proposed bridge structure.

It was most efficient to base this investigation on the same 50 ft lines used for the magnetometer survey. This would ensure double coverage by two different survey methods over a large area of the corridor where the bridge will cross the river, thus reducing the chance for something of significance to be missed.

The transit stations established on the bridge were planned as the end points of imaginary 2,000 yard lines running parallel to the edge of the dredged channel, thus creating a series of lanes stretching downstream from the bridge to a point just opposite the radio tower of the Coast Guard base. After establishing these longitudinal controls over the survey area, a series of latitudinal controls were established on the Charleston shoreline of the river. These controls were specific identifiable landmarks between the radio tower and the bridge selected during a project reconnaissance visit. Termed "event-markers" these controls would be used in association with the transit stations so that points of interest on the river bottom could be accurately relocated at a later date for further investigation.

The corridor of impact in the Ashley River was established as 550 ft in length. The corridor was oriented along the axis of the river and was 1,600 ft wide. The additional distance of 5,450 ft was planned to assist the survey crew in aligning their vessel over instrumentation and visual survey lines and to gather additional data outside the immediate impact area for research purposes in support of the primary objective.

In the Wappoo Creek survey area the impact corridor was established as 300 ft wide and centered on the centerline of the projected ramp crossing the creek. No remote sensing was planned for this area as the creek had been deepened several times in the historic period. This would suggest that large sunken objects such as shipwrecks have already been destroyed.

A visual inspection by divers was planned on 50 ft line spacings. The position of each line would be established from the centerline and marked by stakes. Stakes positioned on the opposite side of the creek would ensure proper alignment.

The Side Scan Sonar

The side scan sonar is an electronic instrument that detects and records topographic features of the sea or river bottom. Unlike a radar which depicts a momentary one dimensional image on a cathode ray tube, the sonar prints a three dimensional rendition of the river bottom on a continuous roll of paper. It works as well in fresh as in saltwater. The recorded image, like a photograph, is permanent. It is particularly useful in conducting underwater archaeological surveys because many man-made objects such as collapsed piers and bridges, pilings, shipwrecks, and miscellaneous debris often project a profile above the bottom and are recorded as bottom features.

The sonar is made up of three units: a towfish, a cable, and a recorder. The towfish is a cylinder, approximately 6 inches in diameter by 36 inches in length. It has cross vanes at the tail to keep it stable while under tow, and a bank of transducers on either side which transmit and receive acoustical signals while

in operation. The cable transmits electrical impulses between the towfish and recorder and serves as the towing unit for the towfish. The towfish is trailed behind the vessel at a distance from the bottom that the operator determines will give the most efficient signal considering the target sought. The recorder houses the main electronic components including the power supply, major electronic package timing devices, and the strip chart recorder. Although the sonar accurately depicts bottom contours on the strip chart, it does not differentiate between natural relief and man-made debris lying on the bottom. A skilled operator is often able to make that differentiation between natural and man-made relief, but if he is in doubt, a diver must be sent to examine it on the bottom and make an assessment.

The Proton Magnetometer

The proton magnetometer is an electronic instrument which can measure the earth's magnetic intensity at a given location or a series of locations either on land or underwater. For underwater use it consists of three components: a towfish, a shielded electrical tow cable, and a recorder. The towfish is a cylinder approximately 8 inches in diameter and 24 inches in length containing a specially designed coil of fine wire. It is towed behind the survey vessel, near the bottom and generally is programmed to take a reading at regular periodic intervals in order to develop a detailed magnetic background of the area. The towfish is connected to the recorder by a cable which serves two purposes: first to act as the towing medium for the towfish, and secondly, to transmit signals between the towfish and the recorder. The recorder consists of a power supply, timing devices, and a strip chart recorder.

Magnetometers were developed in the 1930s to assist geologists in their search for oil. It had been discovered that oil and certain mineral deposits subtly changed the earth's adjacent magnetic intensity. The magnetometer, when moved along the earth's surface and cycled at a rapid rate, could detect deviations from the norm. It was further refined and used during World War II to detect enemy submarines. It has now reached such a high degree of refinement, sensitivity, and compactness, that it has become the major remote sensing instrument used in underwater archaeology.

Its effectiveness in locating iron wrecks is based on the knowledge that the ferrous metal in a shipwreck, even after long immersion in water, still has a large magnetic component. A wooden shipwreck has two elements with magnetic components: the cannon and ship fittings of iron, and often the ballast rock.

In order to detect the lesser magnetic components of a wooden shipwreck, it is necessary to pass the towfish much closer to the shipwreck than would be necessary in searching for an iron vessel. The ability of the magnetometer, of a type normally used in surveys, to detect an object is related to four major factors:

speed of the towfish through the water; cyclic rate of the magnetometer; size of the magnetic anomaly; and the anomaly's distance from the towfish. Although range is relatively short when compared to the side scan sonar, the magnetometer's sensitivity is omnidirectional and it can detect magnetic anomalies buried under the surface of the bottom. It cannot differentiate between modern ferrous debris on the bottom and the magnetic component of a piece of ancient iron. As with the side scan sonar, a diver might be required to personally investigate each target in order to assess its value to the survey.

Description of Visual Survey Techniques

Visual surveys consist of the examination of the bottom of the survey area by divers utilizing a number of different methods. The research plan for this project called for the systematic search of certain areas of the Ashley River and Wappoo Creek. A visual search was also planned for targets found by remote sensing instruments within these specific areas, should this prove necessary.

Although described as a "visual" search, these operations are often not visual in nature. Loss of light due to depth, particles suspended in the water column, current and bottom conditions, can all combine to prevent the diver from actually seeing in the survey area. In this event, information is gathered by tactile senses. In the case of experienced divers, this results in no loss of quality in the information gathered.

Plans for both the Ashley River and Wappoo Creek areas of the survey provided for the laying down of weighted nylon lines along the designated survey lines. In the Ashley River these lines were to be 50 ft apart. The visual line length was established as 550 ft with line positions to be accurately established by continuous radio contact between the transit operator and the survey vessel. Two divers per line were to be used. Each diver would crawl along the line, holding on with one arm extended while testing the bottom with the other. Assuming an average 6 ft armspan, this would provide a search width of 12 ft per line.

Provision was also made for the visual examination of targets found by remote sensing instruments in the Ashley River. It was planned to place marker buoys on each target as it was located by the remote sensing instruments. A transit operator could then determine which targets lay within the 550 ft impact area. These particular targets could be examined by divers.

In Wappoo Creek, lines 50 ft apart were planned to span a 300 ft corridor from shoreline to shoreline. Only one diver would perform examination of each lane since the principal items of interest would be the existence of fossil beds revealed by dredging activity. Since the search pattern would be across the current and the channel, it was decided to search each line from the center of the channel to each shore. This would ease the problem of working in the current and ensure that divers would

spend less time in the channel where boat traffic was heavy.

Test Excavations

A series of test excavations were also planned to determine the possible existence of artifact layers that might not be indicated by remote sensing instruments. Excavations were planned in areas affected by the two major bridge pilings outside of the dredged channel in the impact area. Excavation was also planned for areas where conditions might prevent the use of remote sensing equipment.

Surface Collections

Provision was also made for the surface collection of artifacts in shoreline areas where cultural depositions might indicate past land use in the impact area.

Safety of Operations

The two impact areas to be surveyed were in the path of considerable boat traffic. On the strong advice of the Coast Guard, a marine radio was purchased to facilitate communication with both the Coast Guard and vessels entering the area of operation. The Coast Guard was also asked to broadcast advisories to mariners warning them of the survey operation.

Daily contact would be made with the Coast Guard to advise them of beginning and end of operations. As with all field projects, Institute staff and contract personnel would be advised of OSHA regulation requirements for the operation and of all emergency services in the project area should they be needed.

Conclusion

The plan of operation was designed to generate sufficient data on the survey area to provide the basis for a sound evaluation of the impact of the proposed bridge on the Ashley River and Wappoo Creek.

FIELD INVESTIGATION

Site Characteristics

The underwater archaeological survey described in this report took place in the lower reaches of the Ashley River and Wappoo Creek in Charleston County, South Carolina. The Ashley is considered a major Coastal Plain river, but unlike most, it is relatively short and has its origins in the Lower Coastal Plain.

Both survey areas are large stretches of open, unsheltered water bordered by marshlands or the city of Charleston. Typical survey conditions included high winds and high tidal currents up to three knots. Water temperature was not considered as a factor since dry diving suits were used which kept the divers warm.

The composition of the river bottom in both survey areas was found to be a mixture of silt, mud, sand, gravel and shell bed. Bottom contours proved to be gently varied due to erosion activity occurring naturally and as a result of artificial obstructions.

Ashley River

The Ashley River flows into Charleston Harbor west of the peninsula on which the city of Charleston is located. Past research and archaeological activity indicates that considerable cultural resources should be present in the river dating from prehistoric and historic times. The general orientation of the river in the survey area is northwest to southeast. The survey area extended from a point about 200 ft downstream from the T. Allen Legare, Jr. Bridge to a point 2,000 yards downstream to an imaginary line which crossed the channel at 39 degrees magnetic to the radio tower at the Coast Guard base.

Wappoo Creek

Wappoo Creek forms part of the Atlantic Intracoastal Waterway from Buzzard's Point on the Stono River to Eagle's Marsh on the Ashley River. It has been widened and deepened a number of times in the historic period and is still the subject of routine dredging when necessary. The survey area in Wappoo Creek was near where the creek enters the Ashley River and consisted of a 300 ft wide corridor centered upon the point over which a connector ramp of the proposed expressway will run.

Remote Sensing

Side Scan Sonar Survey

The side scan sonar unit used for this survey was a Klein Associates Hydroscan Model 521 with a frequency of 500 kHz. It was leased from the United States Army Corps of Engineers, Charleston District.

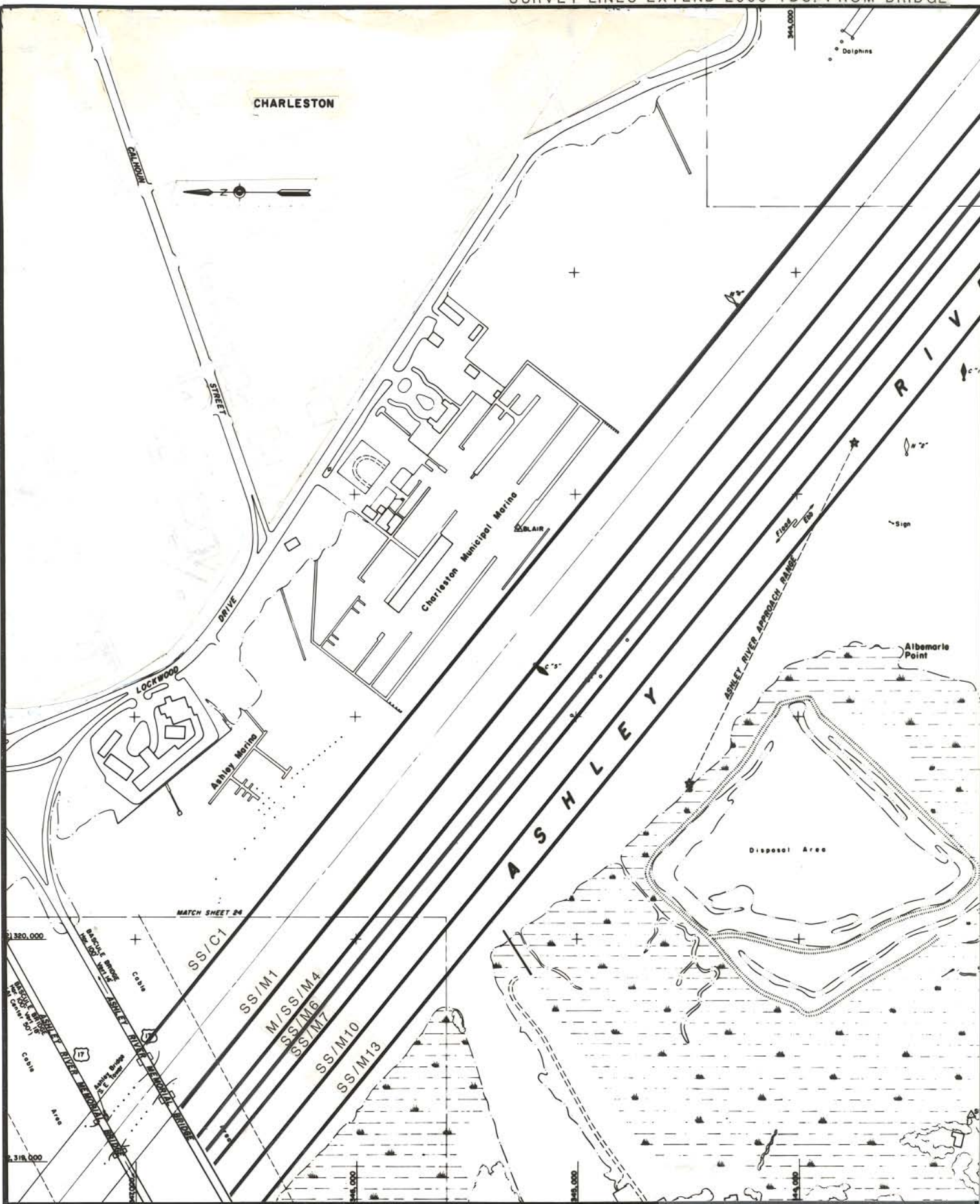
The survey was carried out in a 24 ft Robalo with an enclosed cabin. Corps technicians James Hadden and Charles Crosby operated the survey vessel and the sonar unit respectively. Two Institute staff members monitored the operation in the boat and assisted in the annotation of events. Two other members of the Institute staff were positioned on the T. Allen Legare, Jr. Bridge. This team operated the transit which positioned the vessel on the axis of each predetermined survey line, at an angle of 129 degrees, using the bridge as a baseline. One member of the team operated the transit and the other transmitted transit operator's instructions to the boat operator via citizens band radio.

In accordance with the plan of operation, the sonar survey lines were spaced 150 ft apart (Fig. 3). Only one line, C1, was run on the city side of the channel. This was due to the deep intrusion of the City Marina and the Ashley River Marina into the survey area. On the marsh side of the channel the survey was run on lines M1, M4, M7 and M10. An additional line was run on M6 in order to more closely examine a target found in this general area.

The survey vessel began each run from a location below the downstream end of the 2,000 yard survey line. This was done to enable the transit operator to have sufficient time to accurately position and orient the vessel on the proper line prior to entering the survey area. As the vessel passed each event at an angle of 39 degrees as plotted on a Weems compass, a mark was made on the strip chart and noted with the event number (Fig. 4). The 39 degree angle kept all events at right angles to the survey line. When targets were detected, they were also noted on the side of the strip chart by the sonar operator (Fig. 5). This notation, when compared to the nearest event marks and the position of the vessel on the survey line, provided an accurate position for relocation of the target.

This procedure was followed until all the lines were run. The only pre-selected line not completely run was M13 which proved to be too shallow for effective sonar use.

After the sonar survey was completed, the strip chart records were thoroughly examined by Institute staff. All targets noted were analysed. Particular attention was given to targets between event marks #24 and #28. This is the area in which most of the bottom disturbance is expected to take place during bridge construction.



APPROXIMATE SCALE: 1/3 = 200'

Figure 3:
50 meter lanes in side scan survey of Ashley River.

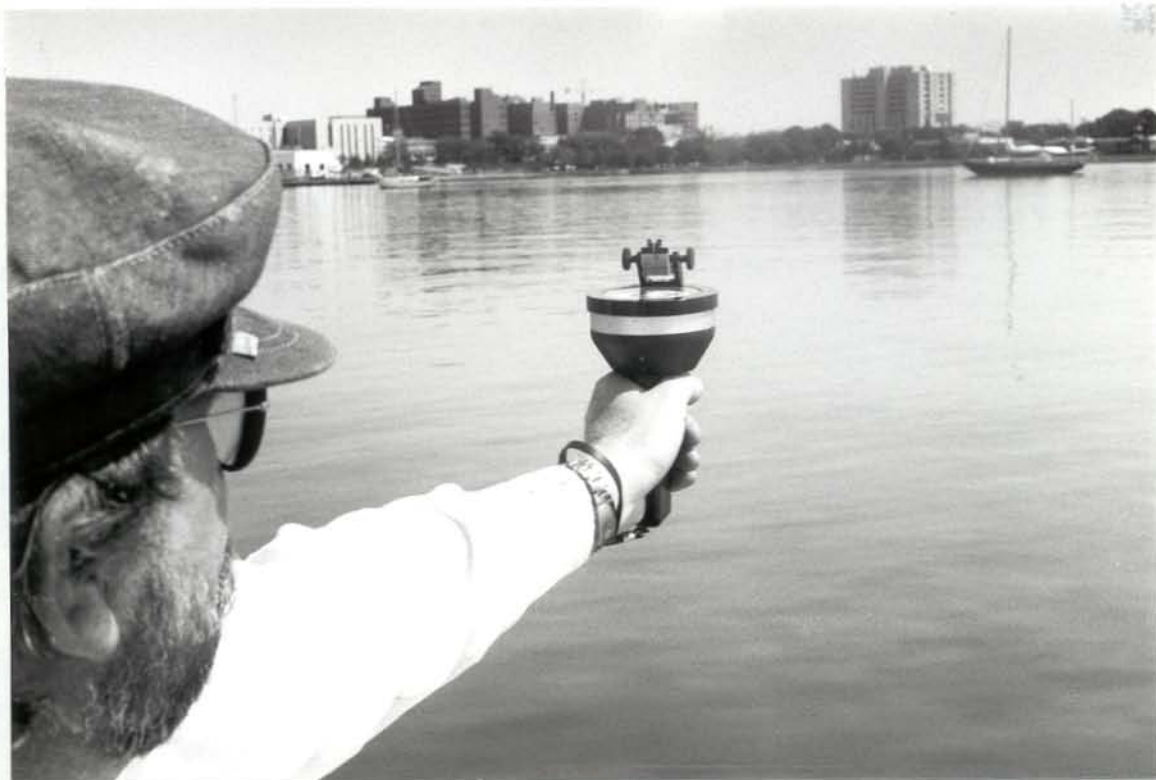


Figure 4:
Events were recorded at right angles to the survey lines, a 39
degree magnetic position on a Weems compass.

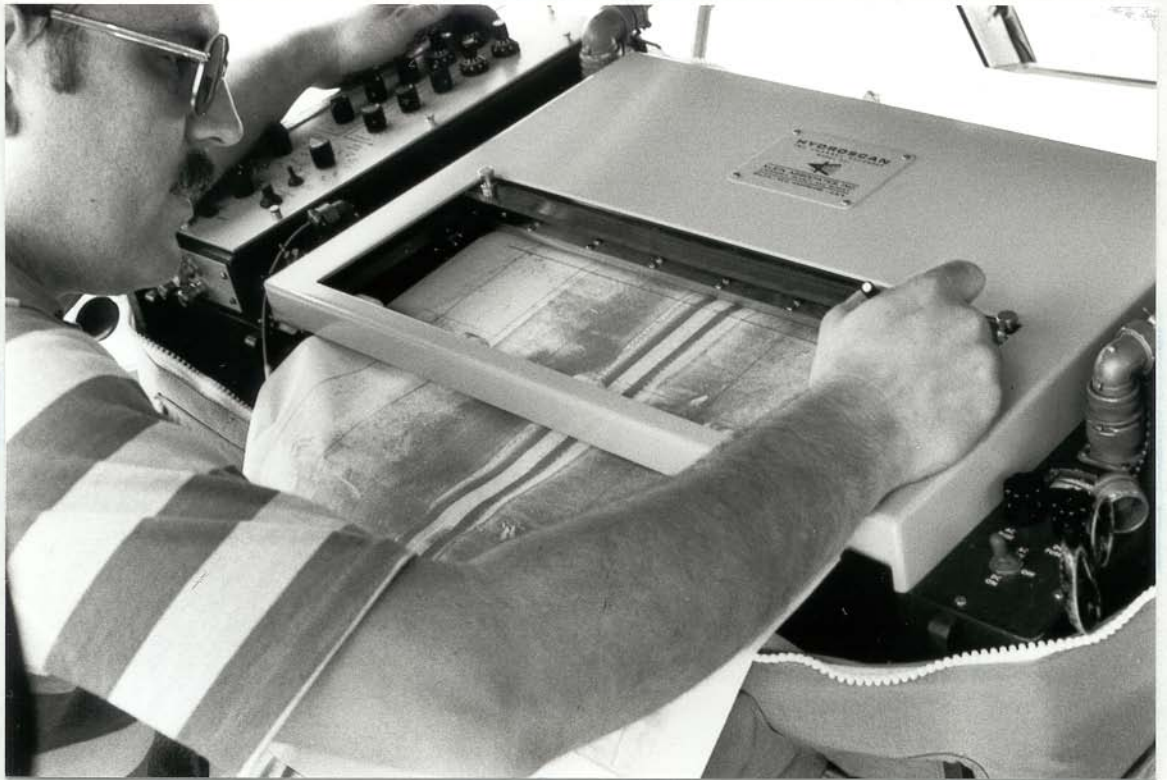


Figure 5:
The Klein Hydroscan Model 521 in operation.

The only major targets of interest within this area were found between survey lines M6 and M8. Laboratory analysis indicated that the targets were most likely to be bottom scouring and debris from the removal of dolphin-type channel markers (Fig. 6). Early navigation charts showed dolphins in this location and subsequent visual surveys confirmed this analysis.

Proton Magnetometer Survey

The magnetometer used in this survey was an Elsec model 7702 Proton Precession Magnetometer with a torroidal submersible head. It had a sensitivity of 1 gamma and a cyclic rate of 2 seconds.

The instrument was leased from Tidewater Atlantic Research of Washington, North Carolina. Gordon Watts, president of the company, was the operator. The survey vessel used was a 24 ft semi-enclosed Harris "flote-bote" owned by the Institute.

With one exception, the magnetometer phase of the survey was carried out using exactly the same methodology as that used in the sonar survey. The exception was that the survey lines were spaced only 50 ft apart rather than 150 ft (Fig. 7). This was done to take into account the narrower survey range of the magnetometer compared with the side scan sonar.

Two lines were run on the city side of the river, C-1 and C-2. Fourteen lines were run on the marsh side of the river, M-1 through M-14. The narrow area between the downstream wall of the City Marina (Event 24) and the Coast Guard tower (Event 1) was not examined by the magnetometer as many sailboats and motorboats used the area for semi-permanent mooring on anchored buoys. It was felt that the metal buoys, chain and anchors would completely mask whatever significant readings might be present in the area. At no time during the field operations was this moored area clear of vessels.

Targets were observed in the impact area between Events 24 and 28. These were identified during laboratory analysis as crab pots or metallic debris observed during the previous sonar and visual surveys (Fig. 8).

Visual Survey

Two visual surveys were required in the impact area of the proposed James Island Bridge. These were in the Ashley River for the main "feeder" lanes to and from Charleston and for the connecting ramp over Wappoo Creek to Savannah.

Wappoo Creek

The first visual survey was conducted in Wappoo Creek. The creek is a section of the Atlantic Intracoastal Waterway connecting the Stono and Ashley Rivers. It has been extensively widened

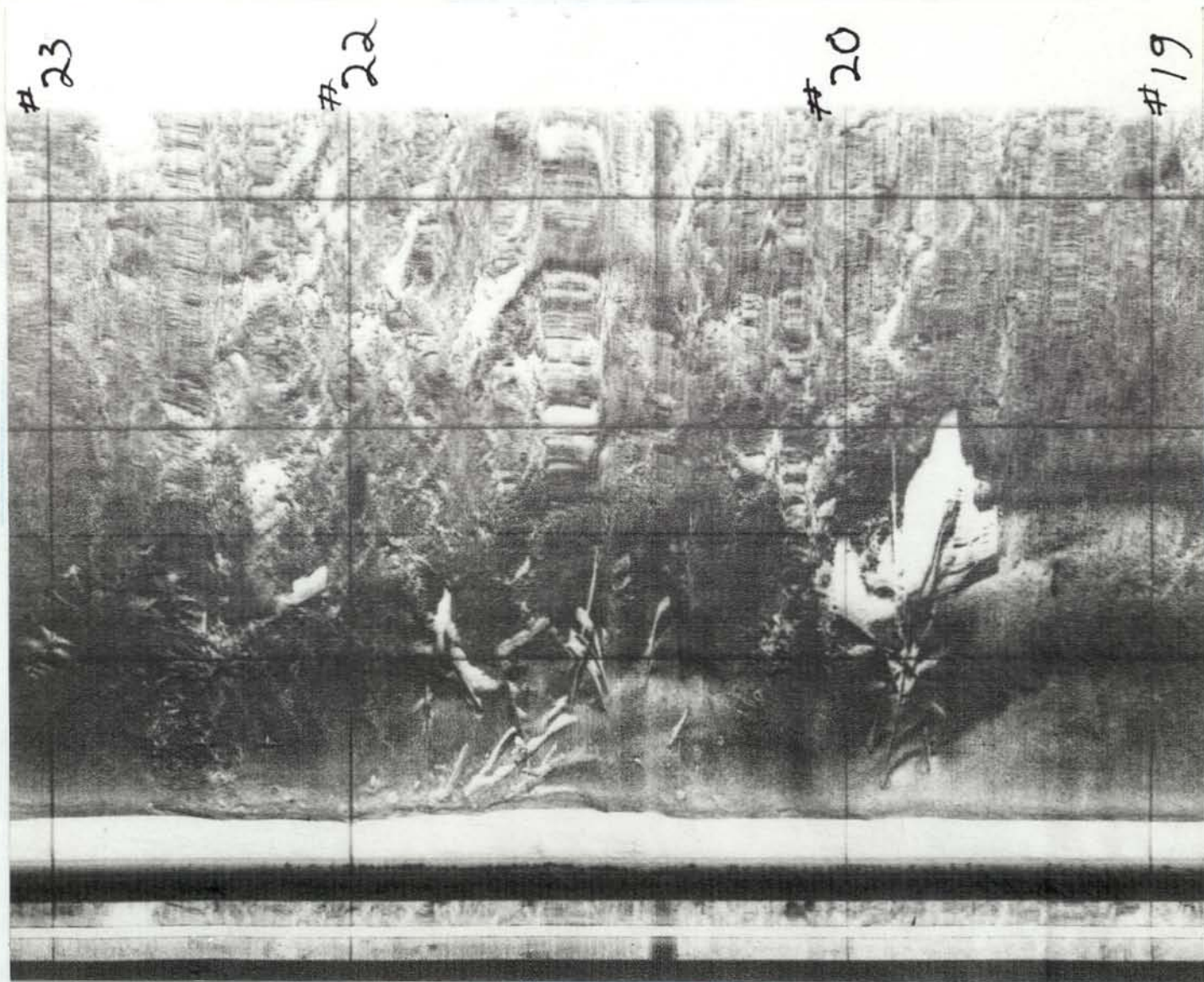
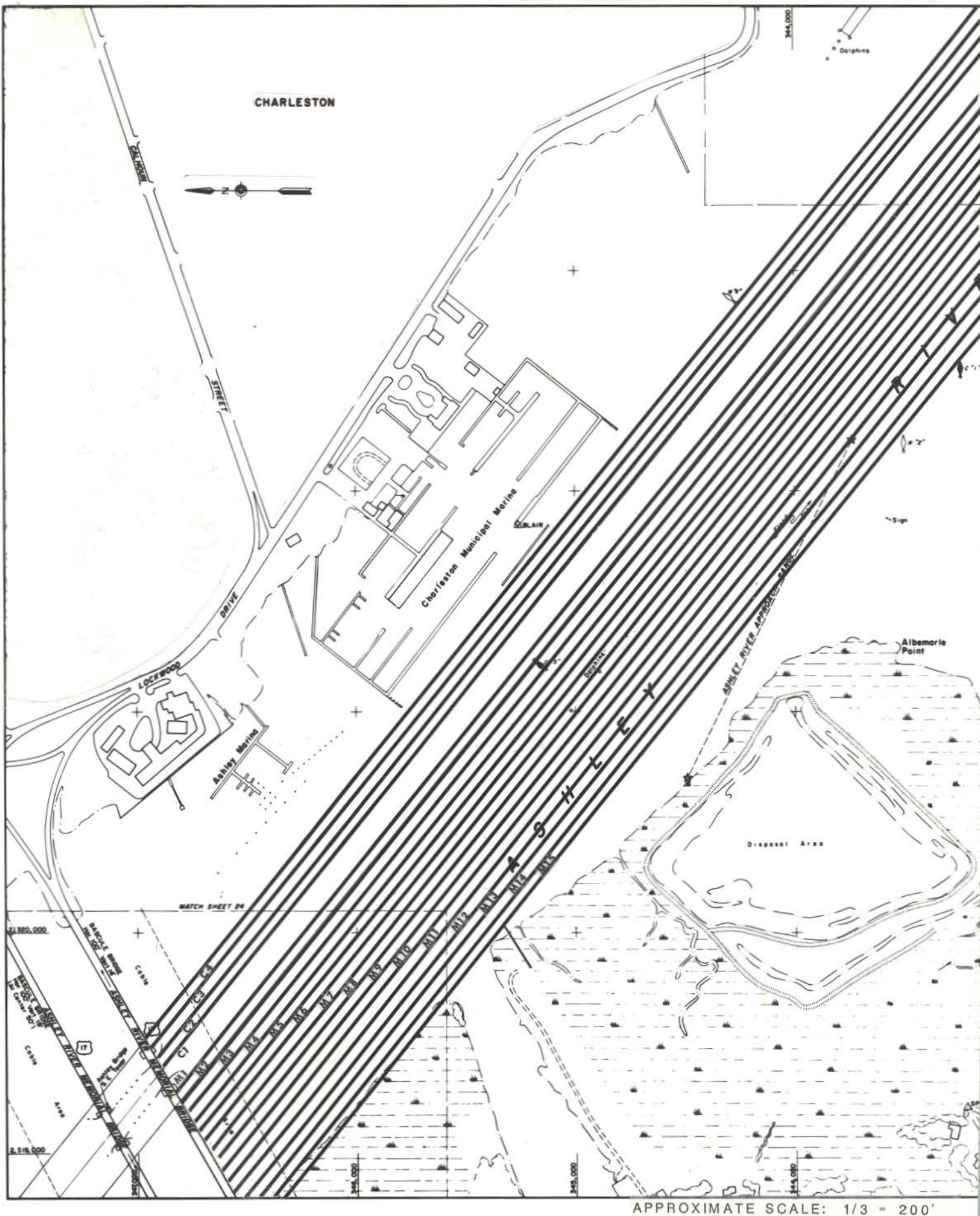


Figure 6:
Scouring, sand banks, pine poles and metal cable in lane M5 - M7
as shown on side scan sonar chart.



APPROXIMATE SCALE: 1/3" = 200'

Figure 7:
50 ft survey lines for magnetometer runs.

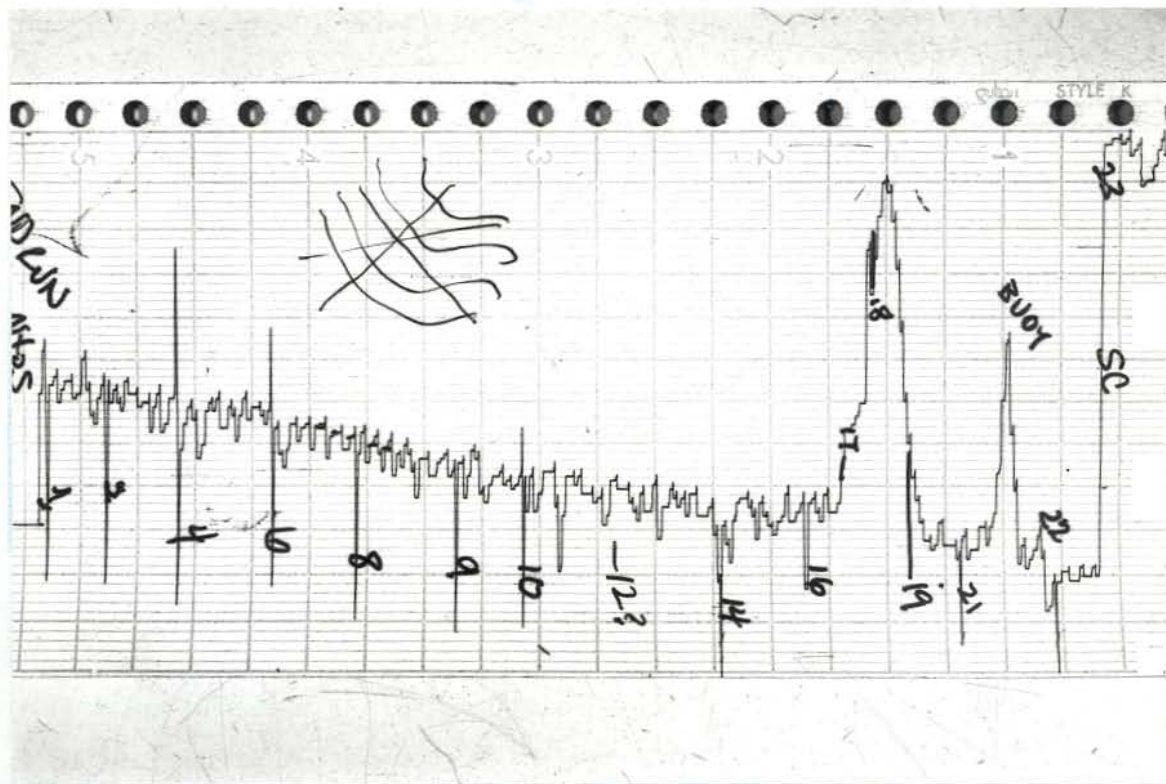


Figure 8:
Magnetometer strip chart showing target which corresponds with metallic debris on lanes M5-7 recorded on sonar chart and by visual inspection (arrows) and number event markers.

and deepened in the historic period. For this reason the area was scheduled for a visual survey only in order to identify fossil beds that may have been exposed by dredging activity.

The central axis of the impact area was determined from line drawings of the bridge area provided by the South Carolina Department of Highways and Public Transportation. Flagged, metal stakes were driven into the north shore of the creek at the centerpoint of the proposed ramp and at 50 ft intervals until a distance of 150 ft either side of the centerpoint had been covered. A numbered stake was then driven into the marsh bank 20 ft behind each metal stake. The position of this stake was determined by a viewer with a Weems compass on the opposite bank of the creek. According to the Highway Department engineering drawings, the expressway ramp is to cross Wappoo Creek at one degree off magnetic north, at 1 degree W.

The one degree variance was ignored and a compass used to establish a direct north-south (0-180 degree angle) between the foreshore marker and the numbered stake behind it. The same procedure was followed on the south bank of the creek thus creating range-markers for seven parallel lines across the impact area (Fig. 9).

The distance across the creek was approximately 600 ft. It was considered impractical to attempt to cross this distance with one survey line due to the excessive tidal currents and the presence of heavy recreational boat traffic.

The distance was therefore divided into two lines of 300 ft each, to be investigated by searching from the center of the channel and crawling to each shore. Operating from a 20 ft McKee craft, the lines were laid by first dropping a 40 lb anchor at the center of the channel and in line with a set of range markers. The line was then payed out towards the shore using the boat to keep the line taut. During this procedure the boat was kept in line with the range markers. On reaching the shore the line was staked to the beach. Each line was weighted down at 100 ft intervals by a 16 lb concrete anchor.

A diver was dropped down a buoyed line to the 40lb anchor. At the bottom the diver unclipped the buoy-line and proceeded towards the shore. The buoy line was then retrieved by the boat operator, clearing the channel for traffic. After the bouy-line was retrieved, the survey boat immediately proceeded to the shoreline end of the survey line to await the diver.

As the diver traversed the creek, note was taken of any special features and bottom conditions. On surfacing at the shore, the diver was immediately debriefed. Information was recorded from each of the anchor locations in order to provide some control for later co-relation of bottom conditions on each lane. Any artifacts recovered were analyzed for possible significance before being either discarded or saved for later laboratory

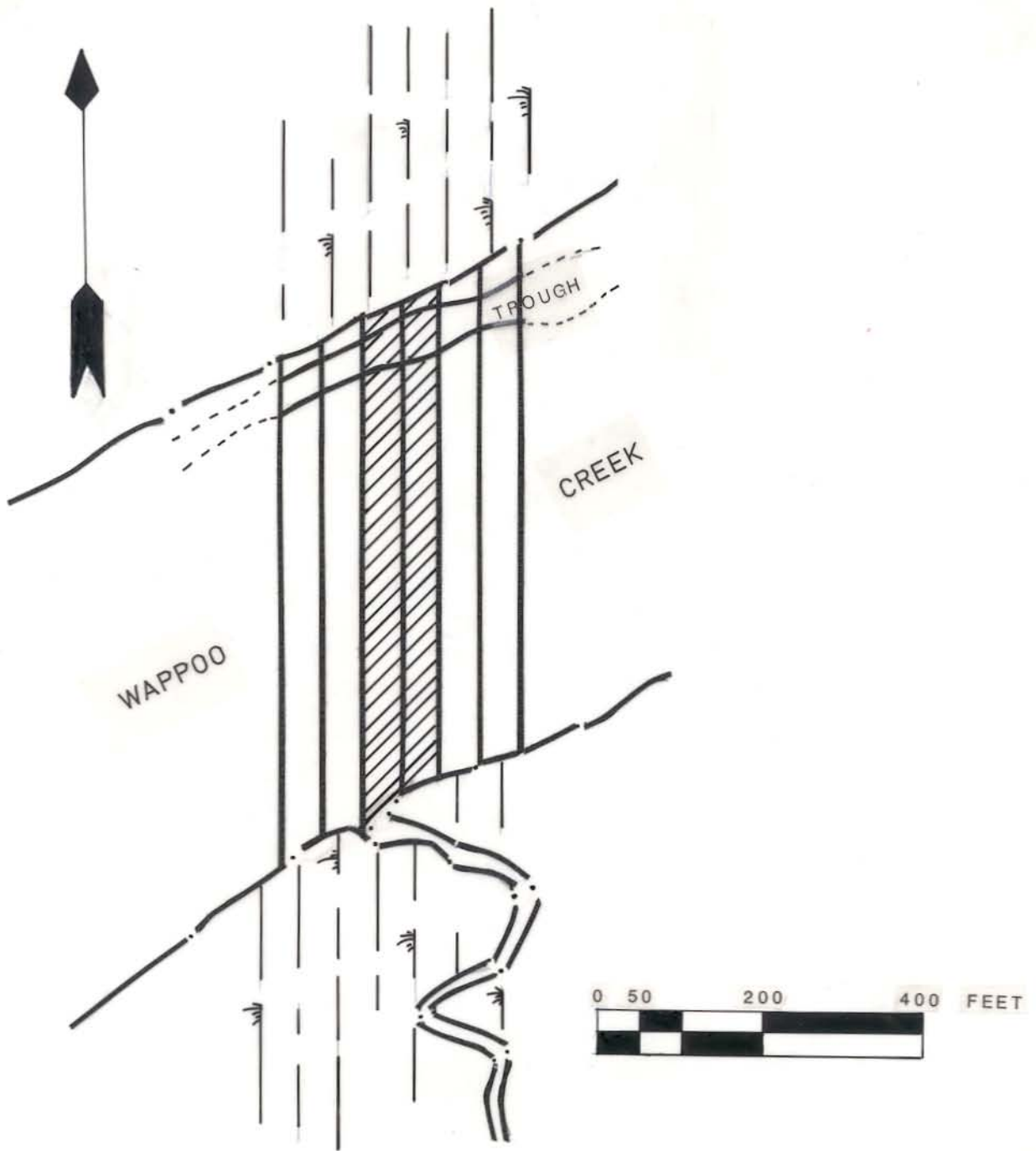


Figure 9:
Seven 600ft long by 50ft wide lanes covered in visual
survey of Wappoo Creek.

analysis. This procedure was repeated until all 14 half lines had been covered.

The completed survey indicated that the impact area consists of a 12 ft deep channel through sand, mud and shell beds. Some isolated artifacts of little significance were observed but no fossil bed deposits of major interest (Appendix A). The only recorded bottom feature of note was an 8 ft deep trough on the south side of the creek. This feature was designated "Newell's Trough" for the diver who found it. The length of the trough was not determined as it extended beyond the perimeter of the survey area.

Ashley River

The Ashley River portion of the visual survey required examination of the impact area in a series of 550 ft long lines running parallel to the channel between events 24 and 28 (Appendix B)(Fig. 10). The area was divided into two sections, the marsh side and the city side; the dividing line being the center of the channel. The marsh side of the survey consisted of 14 lines and the city side 2 lines. The fewer lines on the city side were due to the fact that the Charleston City Marina and the Ashley River Marina formed two obstructions intruding into the survey area and preventing the use of a line survey method close to the city shoreline.

Accurate line spacing and line laying was accomplished by dropping a 40 lb anchor along a predetermined angle as shot by a transit operator on the bridge and directly opposite pre-set range markers in the marsh. The transit operator then directed the boat downstream along a line-of-sight by giving instructions to the boat operator over citizens band radio. This procedure was repeated for each 550 ft line used in the visual survey. Weights were located at 100 ft intervals and two 16lb concrete anchors were used to hold the down-current end of the line.

Surface buoys were attached to both ends of the survey line. Two divers were dropped on the first buoy line and then picked up at the second. The dive teams descended to the river bottom down the first buoy line. At the bottom they oriented themselves to both sides of the survey line, holding on to it with one outstretched arm while testing the river bottom with the other. This created a 12 ft wide search pattern down the length of the line. On completion of the lane the divers were debriefed and a record of bottom conditions made for each anchor location.

The survey team anticipated the collection of a large amount of cultural debris from this area of Charleston Harbor since it has been occupied since earliest colonial times. However, artifacts observed amounted to modern debris such as cable sections, metal ships' fittings and modern glass bottles. The only artifact of any considerable significance found was a black glass spirits bottle, circa 1790, found on marsh lane 3, (Fig. 11) (Appendix C).

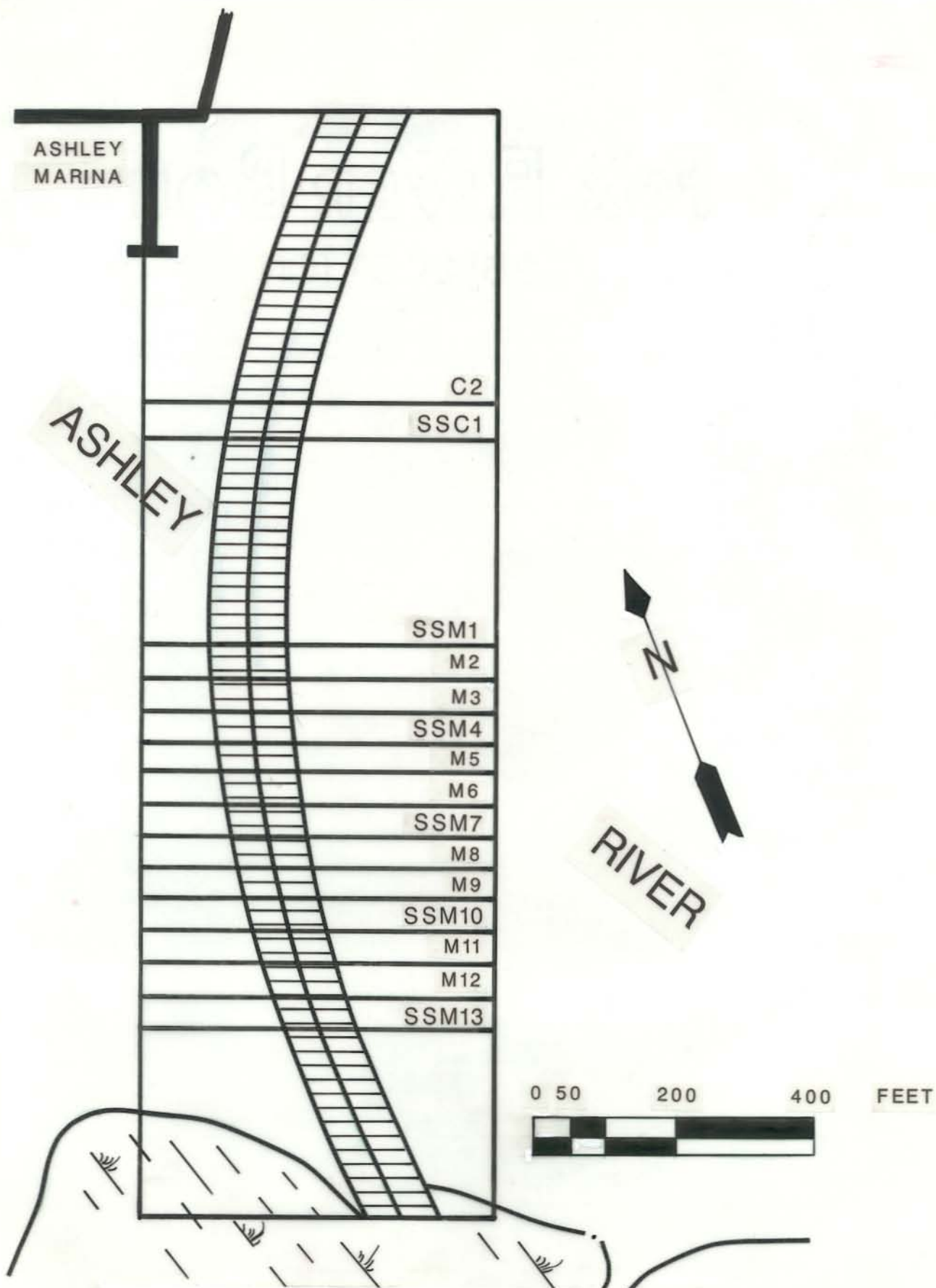


Figure 10:
Fifteen 550ft lanes with 50ft separation
covered on visual survey of the Ashley River.

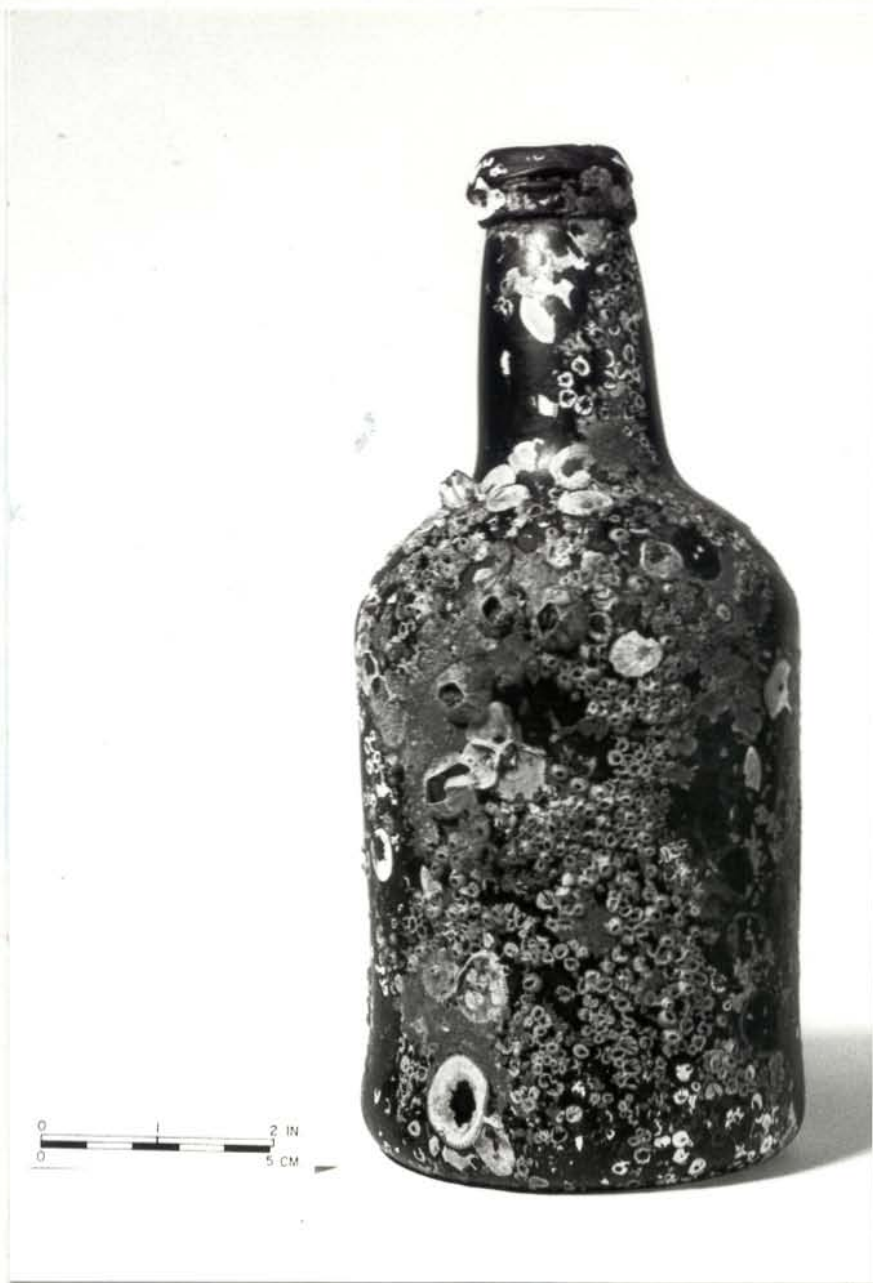


Figure 11:
Intact black glass spirits bottle found on visual lane M3
by contract diver Dave Beard.

Visual Inspection of Remote Sensing Targets.

Normally, separate inspections would have been made of all targets found by remote sensing instruments in the impact area. In this case, laboratory analysis confirmed that targets found by side scan sonar were identified during the visual lane survey. Those targets found during the subsequent magnetometer survey were also identified as metal debris and crab pots found during the same visual lane survey. For this reason no targets were inspected as a separate activity.

Visual Survey of Calhoun Street Ramp Area

One 300 ft line was placed within the perimeter of the area between the Ashley River Marina and the City Marina in order to provide a controlled survey of the location of the ramp joining Calhoun Street. Divers noted deep, soft mud over the entire area, in water which was 12 ft deep, dropping to 25 ft on the upstream side of the City Marina retaining wall. The survey line, and consequently the divers, were pulled into this bottom feature by strong tidal currents. The feature was subsequently named the "Trough of Terror" (Fig. 12).

Test Excavations

Three test excavations were undertaken within the impact area of the Ashley River to make a determination as to whether or not archaeological remains of significance might be encountered during placement of the proposed expressway bridge pilings.

The first two were carried out in the two locations where the major bridge support pilings will be located. The third was carried out at a selected area between the two marinas (Fig. 12).

The same bottom conditions were encountered in all three excavation areas. These were deep firm mud with occasional patches of sand and shell. No change in the strata was recorded over a depth of 5 to 6 ft below the river bottom. No artifacts or other cultural remains were encountered (Appendix D).

The device used to carry out the excavation was a 4 in. airlift. This is a rigid hollow tube with a provision for pressurized air to be introduced into the bottom of the tube. The air rises up the tube, expanding as it does so, thereby creating a suction which draws up with it material from the river bottom. This is a standard excavating tool used by underwater archaeologists.

Surface Collection

On the city side of the Ashley River, immediately opposite Calhoun St., and within the proposed James Island Expressway impact area, there is a drainage culvert that empties into the river. It was observed by the survey team that alongside the

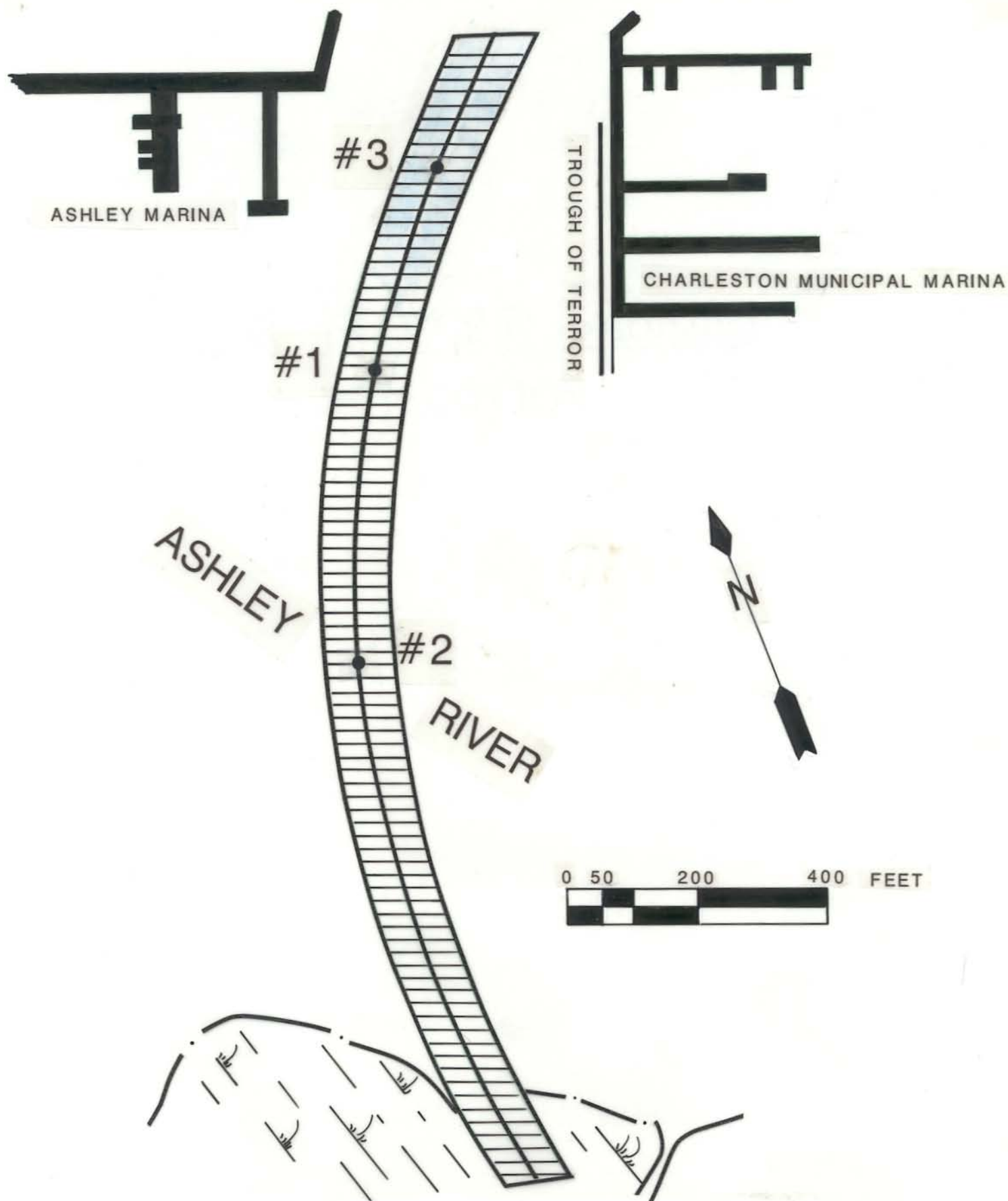


Figure 12:
Location of bridge between Ashley and City marinas showing
test excavation areas and visual survey.

southern edge of this culvert were exposed numerous sherds of ceramics, many of which were easily recognized as 18th century utilitarian-ware. Also observed were a large number of glass and bottle fragments, including black-glass spirits bottle bases and S.C. Dispensary facings. Therefore, it was proposed that a quick surface collection be made to determine any further potential in this area.

Since this area was clearly disturbed by tidal action and highly contaminated by modern debris, the collecting strategy was selective, biased, and aligned along the length of the culvert. Samples were taken to reflect the type-style and temporal range of those sherds being constantly exposed out of the tidal mud.

Tentative laboratory analysis indicates that there is a great deal of historical material yet to be found in this area. Few associations may be valid because of the highly disturbed nature, though some statistical criteria may be significant. Therefore, it is recommended that on-site observation be maintained by a qualified archaeologist if and when this area is disturbed by construction.

Conclusion

The underwater archaeological field survey phase of the potential impact area of the Ashley River and Wappoo Creek was completed in 20 working days as scheduled.

The survey methodology utilized remote sensing, controlled and visual survey methods, controlled test excavation and terrestrial surface collection.

Of the 9,600,000 square feet of total river bottom surface area (from 200 ft. south of the T. Allen Legare, Jr. Bridge to a point 2000 yds. downstream), 7,200,000 sq. ft. were available for investigation by side scan remote sensing. This available area excludes the shallow mud banks on both sides of the river.

Within the 7,200,000 sq. ft. available, 6,480,000 sq. ft. of bottom profile were mapped on side scan sonar printouts for a total coverage of 90% of the available area. The remaining 10% could not be surveyed due to the presence of both the Charleston and Ashley Marinas projecting into the survey area. As a result, 67.5% of the total river bottom surface area described above was investigated and mapped. Included within this mapped area was the entire proposed bridge impact area.

The magnetometer survey also covered the above area with a comparable confidence-level saturation survey of the proposed bridge impact area. Anomalies encountered were correlated with features noted on the side scan survey printout or investigated independently.

The controlled visual line survey in Wappoo Creek covered 25,200 sq. ft. of the creek bottom, or 14% of the proposed impact area at that location.

The controlled visual line survey in the Ashley River covered 112,200 sq. ft. of the river bottom in the proposed bridge impact area, or 20% of the total area available.

The single most significant aspect of the research findings was the unusual absence of discernible cultural material in the Ashley River impact area. Activity in the area over the pre-historic and historic period would suggest a large deposition of cultural materials in this area. The survey indicated the presence of material only on the extreme edge of the impact area - along the city shoreline. Heavy silting is the presumed explanation for the absence of material on the present river bottom.

The field portion of the survey and subsequent lab analysis of the data gathered indicates to the authors that there is no discernible archaeological or paleontological reason to delay the construction of the proposed James Island Expressway.

APPENDIX A

Visual Lane Investigation Results: Wappoo Creek

Lane	Diver	Artifacts Recovered:	Observed:
S1	Brewer	na	na
Comments: 0': sand: 100': firm mud: 200': mud: 300': shell			
Lane	Diver	Artifacts Recovered:	Observed:
S2	Brewer	na	na
Comments: 0': sand & shell. 100': Newell's trough. 200': shell & sand. 300': shell bed.			
Lane	Diver	Artifacts Recovered:	Observed:
S3	Newell	na	na
Comments: 0': mud & gravel. 100': sand & mud. 200': mud & shell 300': shell bed to beach.			
Lane	Diver	Artifacts Recovered:	Observed:
S4	Newell	na	na
Comments: 0' firm mud. 100': sand & mud 200': mud & deep trough 300': Oyster shell bed to beach up sharp incline.			
Lane	Diver	Artifacts Recovered:	Observed:
S5	Newell	na	na
Comments: 0': firm mud. 100': sand & mud. 200': mud. 300': shell bed on steep incline.			
Lane	Diver	Artifacts Recovered:	Observed:
S6	Newell	na	wood plank fragment
Comments: 0': sand. 100': firm mud. 200': shell bed 300': shell			
Lane	Diver	Artifacts Recovered:	Observed:
S7	Newell	na	na
Comments: 0': sand & rock 100': firm mud & rock. 200': silt & shell. 300': silt & shell.			

Appendix A cont.

 Lane Diver Artifacts Recovered: Observed:

N1 Brewer na na

Comments: 0': firm mud. 100': Newell's Trough, shell bed. 200': shell & sand. 300': shell bed.

 Lane Diver Artifacts Recovered: Observed:

N2 Brewer Ballast stone na

Comments: 0': firm mud. 100': firm mud. 200': ballast stone on firm mud bottom. 300': shell bed to beach.

 Lane Diver Artifacts Recovered: Observed:

N3 Brewer Brick conglomerate na

Comments: 0': firm mud. 100': Conglomerate at first anchor. 200': firm mud. 300': soft mud

 Lane Diver Artifacts Recovered: Observed:

N4 Brewer na na

Comments: 0': firm mud. 100': soft mud. 200': shell 300': shell

 Lane Diver Artifacts Recovered: Observed:

N5 Brewer na na

Comments: 0': firm mud. 100': shell 200': shell 300': shell

 Lane Diver Artifacts Recovered: Observed:

N6 Brewer Iron conglomerate na

Comments: 0': Iron conglomerate at anchor position. 100': firm mud. 200': shell. 300': shell.

 Lane Diver Artifacts Recovered: Observed:

N7 Brewer na na

Comments: 0': firm mud. 100': soft pluff mud. 200': ud & shell 300': mud & shell.

APPENDIX B
Listing of Ashley River Event Markers

Event Number	Description
1	Coast Guard Radio Tower
2	Row of street lights on Coast Guard dock
3	Single pole with large flood lights on dock
4	Dolphins at end of Coast Guard dock
5	White triangular roof*
6	Center window on white porch
7	Center chimney on apartments
8	White board/sign on pole
9	First dormer window on next house
10	Red Can Buoy Number 4
11	Black Church steeple*
12	Corner of grey tower complex
13	End of culvert at harbor bank
14	"No Wake" sign on downstream City Marina wall
15	White metal frame on City Marina wall
16	Downstream corner of Customs House
17	Upstream corner of Customs House
18	Downstream end of City Marina outer barrier
19	First gap in outer barrier wall
20	Third gap in outer barrier wall
21	Upstream end of outer barrier wall
22	Large brick smoke stack
23	Red Box on top of brick building
24	Upstream City Marina wall
25	End of Calhoun Street culvert
26	Large Exxon sign on Ashley Marina dock
27	Two transformers on pole behind dock
28	Red Brick chimney on Charleston Inn roof
29	Charleston Inn sign
30	Elks Building sign
31	Upstream end of Ashley Marina dock
32	Transformers on pole at and of bridge

* Not used in survey

APPENDIX C
Visual Lane Investigation Results
Ashley River

Lane Divers	Artifacts Recovered:	Observed:
M1 Newell/Beard	na	1950 milk bottle rim
Comments: Light sand cover over firm mud.		
Lane Divers	Artifacts Recovered:	Observed:
M2 Newell/Beard	na	Iron hoop and conglomerate
Comments: Light sand and patches of firm mud.		
Lane Divers	Artifacts Recovered:	Observed:
M3 Newell/Beard		Black glass spirits bottle
Comments: Light sand and patches of firm mud, shell conglomerates		
Lane Divers	Artifacts Recovered:	Observed:
M4 Newell/Beard	na	na
Comments: Sand and shell covering firm mud.		
Lane Divers	Artifacts Recovered:	Observed:
M5 Brewer/Beard	na	na
Comments: Light sand cover over firm mud		
Lane Divers	Artifacts Recovered:	Observed:
M6 Brewer/Beard	na	Anchor chain
Comments: Light sand cover over firm mud		
Lane Divers	Artifacts Recovered:	Observed:
M7 Newell/Beard	na	Iron pipe
Comments: Light sand cover on firm mud.		
Lane Divers	Artifacts Recovered:	Observed:
M8 Newell/Beatty		Wood piling with metal and rope cable attached. Heavy bottom scouring.
Comments: Deep sand cover over entire line.		

Appendix C cont.

Lane Divers	Artifacts Recovered:	Observed:
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M9 Newell/Beatty	na	na
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Comments: Light sand cover over firm mud

Lane Divers	Artifacts Recovered:	Observed:
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M10 Newell/Beatty	1950 milk bottle	na
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Comments: Light sand cover over firm mud.

Lane Divers	Artifacts Recovered:	Observed:
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M11 Newell/Beatty	Cable, metal pipe and debris deep scours in bottom.	
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Comments: Deep sand at start of line, sand over firm mud over rest of line (300').

Lane Divers	Artifacts Recovered:	Observed:
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M14 Newell/Beatty	na	Shell aggregates
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Comments: Light sand cover over firm mud.

Lane Divers	Artifacts Recovered:	Observed:
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C1 Rippeteau/Brewer	Chamber pot sherd, soda bottles, Copper fragment, three part glass spirits bottle.	
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Comments: Depth to 45 feet, firm mud, sandy mud and soft mud with shells.

Lane Divers	Artifacts Recovered:	Observed:
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C2 Rippeteau/Brewer	na	na
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Comments: Depth to 45 feet, firm mud, sandy mud and soft mud with shells.

Lane Divers	Artifacts Recovered:	Observed:
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C3* Brewer/Beard	na	na
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Comments:* Random search area between marinas. heavily silted with soft mud. Deeply scoured area close to City Marina wall with heavy current designated "Trough of Terror."

APPENDIX D
Test Excavation, Ashley River

- Location 1 Test pit airlifted to a depth of 6ft in C3 area. Surface of soft silt above soft mud. Mud firmer at 4ft depth down to 6ft. No artifacts recovered or observed. Airlift Operator: Newell, Bottom tender: Beatty.
- Location 2 Test pit at point on C2 line. Airlifted to depth of 6ft. surface of firm mud mixed with shell. This composition extended below depth excavated. No artifacts recovered or observed. Airlift operator: Newell. Bottom tender: Beatty.
- Location 3 test pit in between lanes M3 and M3. Exacvated to a depth of 5ft. Surface covering of 8" of sand followed by 3 - 4' approx of firm mud. No artifacts recovered or observed. Airlift operator: Brewer. Bottom Tender: Beard.